3.7 Factoring Using Algebra Tiles

Representing algebraic expressions with algebra tiles

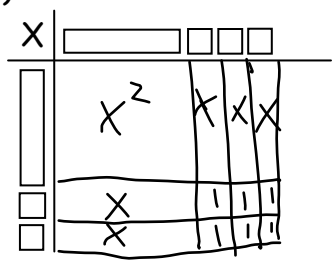
represents 1	represents x	represents x^2
represents -1	represents -x	represents $-x^2$

Multiplying binomials using *algebra tiles (EXPANDING)*

1) Multiply the following binomials using *algebra tiles,* the diagram et then algebraically

Algebra tiles **Diagram** **Algebraically**

a) $(x + 3)(x + 2)$

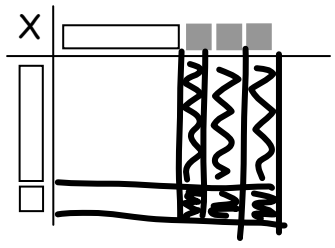


	x	+3
x	x^2	3x
+2	2x	6

$= x^2 + 2x + 3x + 6$

$= x^2 + 5x + 6$

b)



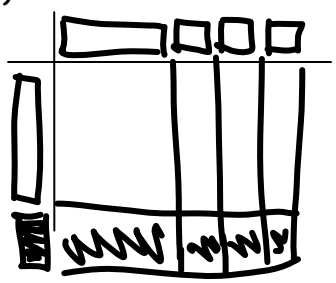
	x	-3
x	x^2	-3x
+1	x	-3

$= (x-3)(x+1)$

$= x^2 + x - 3x - 3$

$= x^2 - 2x - 3$

c)



	x	+3
x	x^2	+3x
-1	-x	-3

$= (x+3)(x-1)$

$= x^2 - x + 3x - 3$

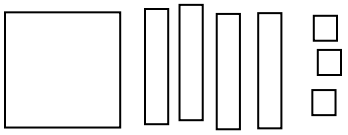
$= x^2 + 2x - 3$

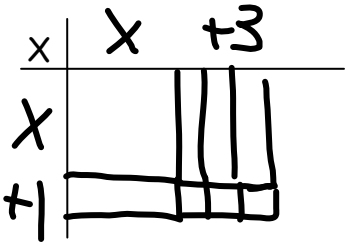
Factoring or creating rectangles

Rules: The large squares (x^2) cannot touch the small squares (1) The tiles in each *quadrant* must all be the same colour

2) Create a rectangle using the following *algebra tiles*

a)



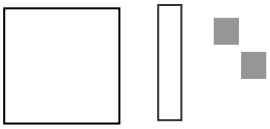


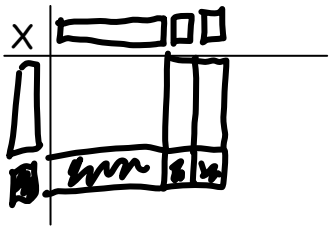
$1 \times 3 = 3$

$1 + 3 = 4$

$x^2 + 4x + 3 = (x+3)(x+1)$

b)





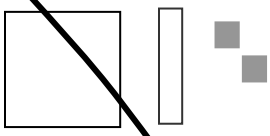
$2 \times -1 = -2$

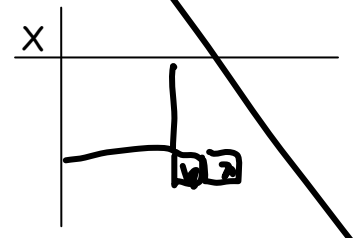
$2 + -1 = 1$

$x^2 + x - 2 = (x+2)(x-1)$

3) Create a rectangle using the following *algebra tiles*

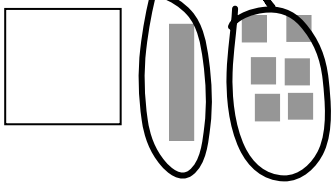
a)

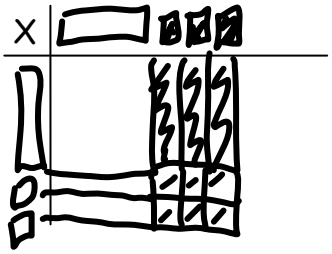




_____ = _____

b)





$2 \times -3 = -6$

$2 + -3 = -1$

$x^2 - x - 6 = (x+2)(x-3)$

c)

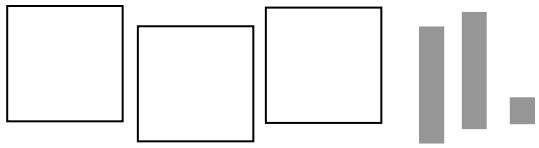
X

$-3 \times +3 = -9$

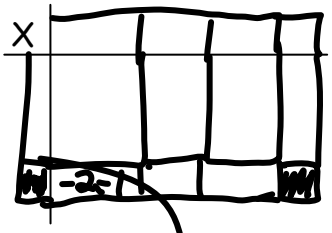
$-3 + +3 = 0$

$x^2 - 9 = (x-3)(x+3)$

d)



X



$3x^2 + \quad = 3x +$

Factoring Simple Trinomials Algebraically when a = 1

Consider: $(x + 2)(x + 3) = x^2 + 5x + 6$

What relationship is there between the factors and the coefficients of the answer?
Think of it this way… What is the relationship between c and b in standard form $y = ax^2 + bx + c$.

Ex.1 Factor

(a) $x^2 + 4x + 3$ Add multiplication

$1 \times 3 = +3$

$1 + 3 = +4$

$= (x+1)(x+3)$

(b) $x^2 - 8x + 12$

$-6 \times -2 = 12$

$-6 + -2 = -8$

$= (x-6)(x-2)$

4) Factor the following expressions and verify your answer by multiplying the binomials.

a) $x^2 + 3x + 2$

$=(x+1)(x+2)$

b) $x^2 + 4x - 12$

$=(x-2)(x+6)$

c) $x^2 + 4x + 3$

$=(x+1)(x+3)$

d) $x^2 - 3x - 10$

$=(x+2)(x-5)$

e) $x^2 + 7x + 12$

$=(x+3)(x+4)$

f) $x^2 - 7x - 8$

$(x-8)(x+1)$

g) $x^2 + 8x + 16$

$=(x+4)(x+4)$

$=(x+4)^2$

h) $x^2 - 4x + 4$

$=(x-2)(x-2)$

$x+2^2$

i) $x^2 - 7x + 12$

$=(x-3)(x-4)$

j) $x^2 - 16$

$=(x-4)(x+4)$

k) $4x^2 - 25$

$=(2x-5)(2x+5)$

l) $49x^2 - 81$

$=(7x-9)(7x+9)$

m) $2x^2 + 3x + 1$

n) $6x^2 - 5x - 4$

o) $6x^2 + 7x + 2$

p) $3x^2 + 7x + 2$

q) $2x^2 + 3x - 14$

r) $2x^2 + 7x + 6$

Assigned Work: p.211 # 2, 4, (6, 7, 8)(ace), 9ace (look for common factors first), 12ace, 13ac